UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/577,754	04/27/2006	Sunil G. Warrier	062.05472-US-AA (04-458)	2823

34704 7590 02/03/2011

BACHMAN & LAPOINTE, P.C.
900 CHAPEL STREET
SUITE 1201
NEW HAVEN, CT 06510

EXAMINER	
MARKS, JACOB B	

ART UNIT	PAPER NUMBER
1729	

MAIL DATE	DELIVERY MODE
02/03/2011	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/577,754	WARRIER ET AL.	
	Examiner	Art Unit	
	Jacob Marks	1729	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-7 and 10-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7, 10-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11-26-2010 has been entered.

DETAILED ACTION

Claims 1-7, and 10-20 are pending. Claims 8 and 9 were cancelled. Claims 1, 10, and 17 were amended.

The text of those sections of Title 35, U.S. code not included in the text of this action can be found in the prior Office Action dated 05-14-2009.

All claim rejections have been maintained.

Claim Rejections - 35 USC § 103

Claims 1-7, 10-12, and 15-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Finn et al. (US Pat. Pub. No. 2003/0224238) in view of Steele et al. (US Pat. No. 6,794,075).

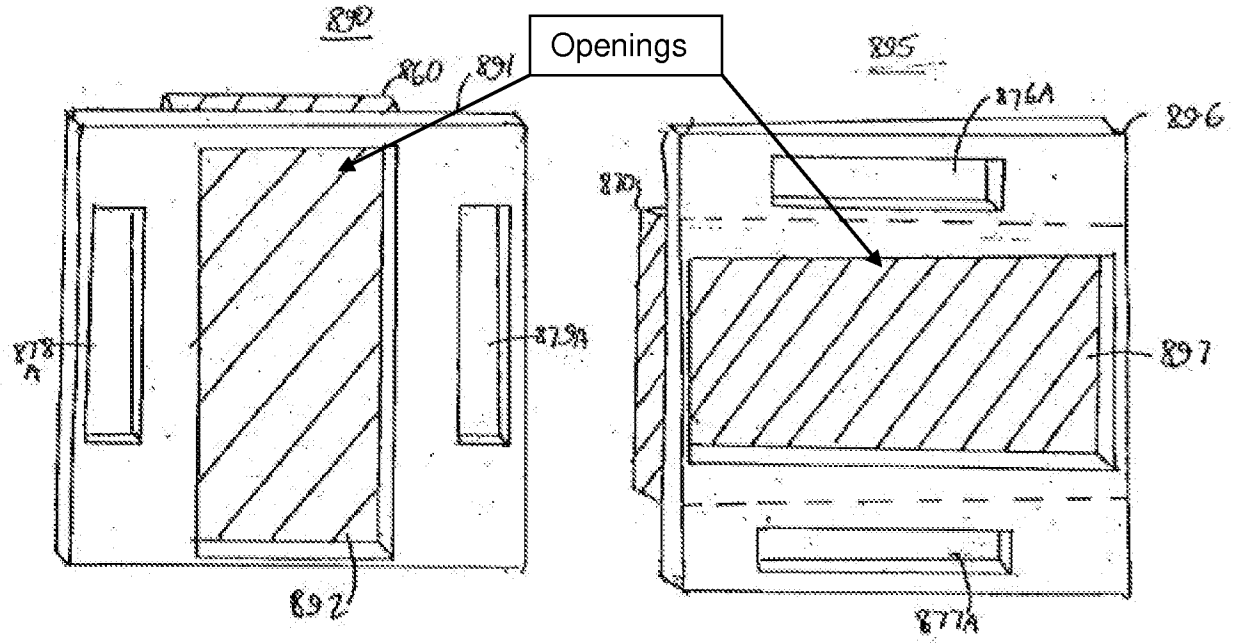
Regarding claims 1, 10, and 17, Finn et al. disclose a solid oxide fuel cell (abstract) stacks (par. 248) comprising: a solid oxide fuel cell having an anode 820 (anode side) and a cathode 830 (cathode side) (par. 268; fig. 37). Finn et al. also disclose separator 50 that acts as a frame around the cathode and the

anode sides (fig. 37; par. 261). Finn et al. further disclose an electrolyte 810 that acts as a bipolar separator, i.e. bipolar plate (par. 268; 279; fig. 46). Finn et al. also disclose anode conductor 860 (interconnect) that is adjacent to the anode side of separator 50 (anode side frame) and a cathode conductor 870 (interconnect) that is adjacent to the cathode side of separator 50 (cathode side frame) (par. 259-260). Finn et al. further disclose a cathode seal 845 between cathode 830 (fuel cell) and the cathode side of separator 50 (cathode side frame) and an anode seal 840 between anode 820 (fuel cell) and the anode side of separator 50 (anode side frame) (see figs 36 & 38). Finn et al. also disclose that the anode conductor 860 (anode interconnect) and cathode conductor 870 (cathode interconnect) are made of compliant felt material (par. 250). Finn et al. disclose that the cathode side seal 845 is a substantially flat compliant member made of felt (see fig. 36-38; par. 179, 253). Finn et al. disclose that the cathode side and the anode side of the frame portion illustrated in fig. 47, which is a part of the frame 850, have an opening coinciding with the respective anode 820 and cathode 830 (fuel cell). Furthermore, the cathode seal 845 (cathode side seal) and anode seal 840 (anode side seal) are positioned within the openings shown in fig. 47.

Finn et al. do not disclose that there is a plurality of openings. However, Steele et al. disclose a solid oxide fuel cell with an opening that allows for reactant to come into contact with the electrode 17, which is similar to the opening taught in Finn et al. (col. 6 lines 18-29 fig. 3 and 5). Steele et al. disclose that several of these solid oxide fuel cells with an opening may be

placed in an array, thereby forming multiple fuel cells with multiple openings (see fig. 5; col. 5 lines 11-40, col. 7 lines 25-60). Steele et al. discloses that creating an array of multiple smaller fuel cells reduces problems due to shrinkage and cracking (col. 7 lines 25-60). Therefore, it would have been obvious to one of ordinary skill in the art to make the fuel cell of Finn et al. into a multiple cell array thereby creating multiple openings because Steele et al. teaches that such a configuration can reduce problems with shrinkage and cracking.

FIGURE 47



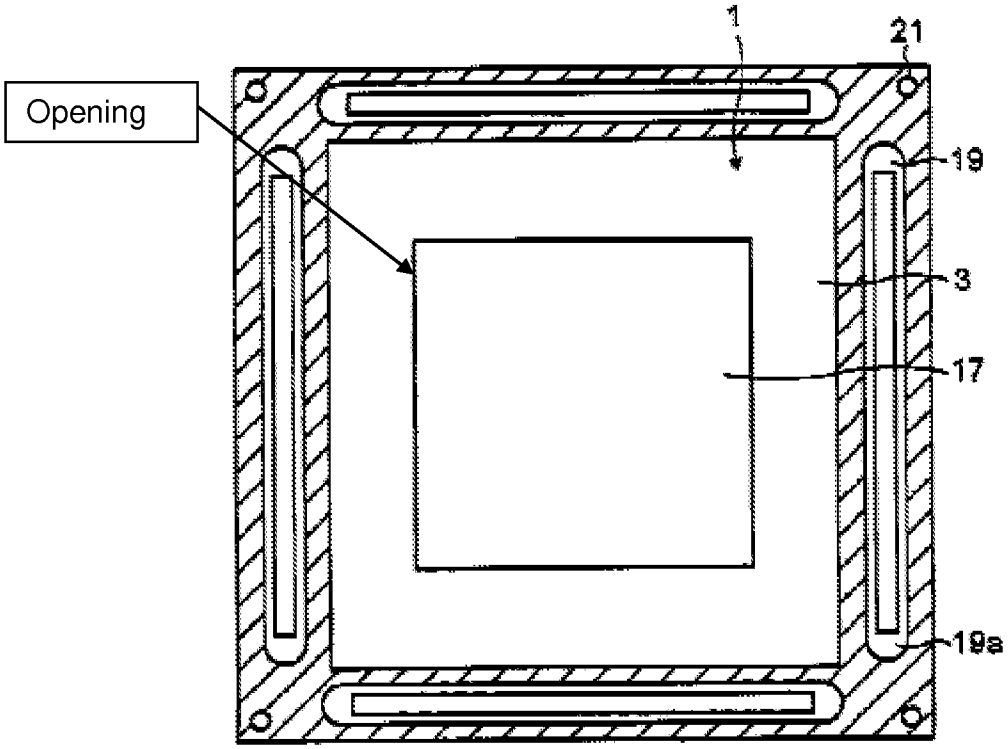


FIG. 3

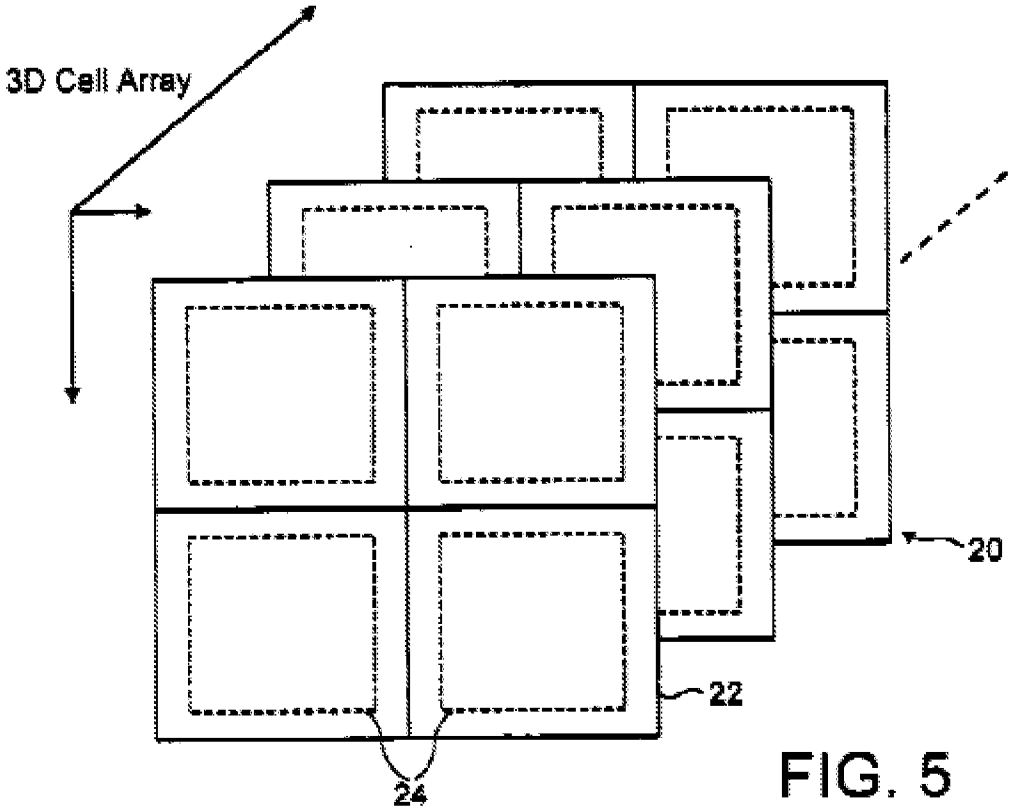


FIG. 5

Regarding claim 2, it is inherent that the anode conductor 860 (anode interconnect) and cathode conductor 870 (cathode interconnect) and the cathode side seal 845 of Finn et al. would be compliant in three dimensions as the felt material from which they are made is compliant (par. 179, 250).

Regarding claims 3, 15, and 16 Finn et al. discloses that the cathode conductor 870 (cathode interconnect) the anode conductor 860 (anode interconnect), and the cathode side seal 845 are made of compliant material (par. 250). Finn et al. further disclose that the felt conductors (interconnect) may also serve as the seal thereby making the cathode seal 845 and anode seal 840

compliant as well (par. 247 & 250). These compliant seals would inherently be floating seals.

Regarding claim 4, Finn et al. disclose that the frame 890 about the anode conductor 860 and the frame 895 about the cathode current conductor 870, which is inherently part of the same frame as separator 50, have openings inside of which the fuel cells are held (see fig. 47).

Regarding claims 5 and 6, Finn et al. does not specifically indicate preferred dimensions of the fuel cell. However, merely changing the size of an apparatus is not sufficient to establish patentably over the prior art. See, *in re Rose*, 220 F.2d 459, 105; MPEP § 2144.04(IV)(A). Therefore it would have been obvious to one of ordinary skill in the art to change the size of the openings (see fig. 47) of Finn et al. to be 4x4 inches or 8x8 inches because changing the size of an apparatus is not novel absent some unexpected result.

Regarding claim 7, Finn et al. discloses that the conductive cathode 870 (interconnect) may be part of the seal thereby making the seal compliant as well (par. 250). The seventh embodiment of Finn et al. does not specifically teach that the seal may be placed in a groove. However, the sixth embodiment of Finn et al. teach that the felt seal may be placed in a groove of the mating structure (par. 246). One of ordinary skill in would recognize that placing the anode seal 840 in a groove in the frame would have the advantage of forming a better seal. Therefore, it would have been obvious to one of ordinary skill in the art to place the anode seal 840 into a groove on the anode side of the frame in order to form a better seal.

Regarding claims 11 and 12, Finn et al. disclose gas passages 876a, 877a, 878a, and 879a (reactant slots) for oxidizer and fuel inlet and outlet flow (par. 228-229). Such passages are positioned around the openings.

Regarding claim 18, Finn et al. do not disclose that there is a plurality of openings. However, Steele et al. disclose a solid oxide fuel cell with an opening that allows for reactant to come into contact with the electrode 17, which is similar to the opening taught in Finn et al. (col. 6 lines 18-29 fig. 3 and 5). Steele et al. disclose that several of these solid oxide fuel cells positioned in an opening may be placed in an array, thereby forming multiple fuel cells positioned multiple openings (see fig. 5; col. 5 lines 11-40, col. 7 lines 25-60). Steele et al. discloses that creating an array of multiple smaller fuel cells reduces problems due to shrinkage and cracking (col. 7 lines 25-60). Therefore, it would have been obvious to one of ordinary skill in the art to make the fuel cell of Finn et al. into a multiple cell array thereby creating multiple openings because Steele et al. teaches that such a configuration can reduce problems with shrinkage and cracking.

Regarding claim 19, Regarding claim 18, Finn et al. do not disclose that there is a plurality of openings. However, Steele et al. disclose a solid oxide fuel cell with an opening that allows for reactant to come into contact with the electrode 17, which is similar to the anode opening taught in Finn et al. (col. 6 lines 18-29 fig. 3 and 5). Steele et al. disclose that several of these solid oxide fuel cells positioned in an opening may be placed in an array, thereby forming multiple fuel cells positioned multiple openings (see fig. 5; col. 5 lines 11-40, col.

7 lines 25-60). Both Steele and Finn et al. teach that there should be one anode opening per fuel cell (see Steele: fig. 5; col. 5 lines 11-40, col. 7 lines 25-60; see Finn: fig. 47, par. 277) Steele et al. discloses that creating an array of multiple smaller fuel cells reduces problems due to shrinkage and cracking (col. 7 lines 25-60). Therefore, it would have been obvious to one of ordinary skill in the art to make the fuel cell of Finn et al. into a multiple cell array thereby creating multiple openings because Steele et al. teaches that such a configuration can reduce problems with shrinkage and cracking.

Claims 13, 14, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Finn et al. and Steele et al. as applied to claims 1-7, 10-12, and 15-17above, further in view of Yasuo et al. (US Pat. No. 5,238,754).

Regarding claims 13 and 14, Finn et al. does not disclose cooling fluid channels on the anode side of the frame and on the cathode side of the frame. However, Yasuo et al. discloses cooling gas holes 6 (cooling fluid channels), which move through the front cathode side and the rear anode side of the frame (col. 3 line 54-col. 4 line 7). The cooling gas holes 6 would inherently carry out endothermic processes in the fuel cell. Yasuo et al. further disclose that the cooling channels can be used to cool the fuel cell and to prevent unevenness in stack temperature (col. 2 lines 53-59; 3 line 54-col. 4 line7). Therefore, it would have been obvious to one of ordinary skill in the art to include cooling channels in the combination of Finn and Steele because Yasuo discloses that such channels can cool the fuel cell and can prevent unevenness of temperature in the stack.

Regarding claim 20, Finn teaches a fuel cell with an anode side frame. The combination of Finn and Steele teach several anode side frames that comprise an outer edge and internal frame structure that define a plurality of openings (see rejection of claims 10 and 13). The combination of Finn and Steele do not teach that there are cooling channels defined along an internal frame structure of the multiple fuel cells. However, Yasuo et al. disclose cooling gas holes 6 which flow through the cathode and anode frame structure in what can be called an internal frame structure of multiple fuel cells (col. 3 line 54-col. 4 line 7, fig. 2). Yasuo et al. further disclose that the cooling channels can be used to cool the fuel cell and to prevent unevenness in stack temperature (col. 2 lines 53-59; 3 line 54-col. 4 line7). Therefore, it would have been obvious to one of ordinary skill in the art to include cooling channels in the combination of Finn and Steele because Yasuo discloses that such channels can cool the fuel cell and can prevent unevenness of temperature in the stack.

Response to Arguments

Applicant argues that the combination of Finn and Steele does not teach much openings as claimed. However, both Finn and Steele teach that the fuel cell has an opening for the reactants to come into contact with the electrode. Steele teaches that the one-opening fuel cells may be placed into an array of multiple fuel cells thereby forming multiple openings.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jacob Marks whose telephone number is (571)270-7873. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ula Ruddock can be reached on 571-272-1481. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jacob Marks/

/Ula C Ruddock/
Supervisory Patent Examiner, Art Unit 1729